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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/871,001	05/31/2001	Robert Anderson Reynolds III	P-1039B	7524

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EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 12/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

0216

Office Action Summary	Application N .	Applicant(s)	
	09/871,001	REYNOLDS ET AL.	
	Examin r	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this c mmunication app ars n the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Pri rity under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>6</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

This paper is in response to the amendment filed on 11/12/03. The applicants have overcome objections, and the 35 USC 112 rejections. However, the claims are finally rejected as the 35 USC 102 rejections and the 35 USC 103 still stand for the reasons of record.

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-10 and 12-20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Mercuri 5846459.

The instant application is directed to a material wherein the disclosed inventive concept comprises the specific graphite intercalation compounds used therein. Other limitations include the specific material and its amount; the layers; the density, the thickness, the electrical conductivity; the thermal conductivity; the electrical resistivity and the resin; in addition, the process for preparing the same is claimed.

As to claims 1 and 12:

Mercuri discloses flexible graphite sheet made by compressing a mixture of relatively large particles of intercalated, exfoliated, expanded natural graphite with smaller particles of natural graphite (abstract). The electrical conductivity is increased (col 1, lines 5-10). It is disclosed that graphite particles are treated with an intercalant of a solution of sulfuric acid and nitric acid, among others (col 2, lines 34-40). Thus, the treated graphite particles are referred as

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particles of intercalated graphite (col 2, lines 39-41). It is disclosed that the flexible graphite sheet is further compressed (col 3, lines 23-25). The method of forming the graphite sheet is also encompasses (col 10, lines 1-10).

With respect to claims 2 and 13:

It is disclosed that graphite particles are treated with an intercalant of a solution of sulfuric acid and nitric acid, among others (col 2, lines 34-40).

As for claims 3-4 and 14-15:

It is disclosed that the quantity of intercalation solution retained therein may range from 20-150 parts of solution by weight per 100 parts by weight of graphite flakes; it may also be limited to 10-50 parts of solution by weight per 100 parts by weight of graphite (col 3, lines 10-25).

With reference to claim 5 and 16:

It is disclosed that graphite is made up of layers planes of hexagonal arrays or networks; wherein these layers are substantially flat (col 1, lines 12-16).

On the matter of claims 6-10, 17-20 and 22:

It is disclosed that flexible graphite has a density of about 3-10 lbs/ft³ and a thickness of from 0.1-1 inch (col 3, lines 35-40); it is further disclosed that sheet or foils typically has a thickness of 0.002 to 0.180 mm and a density of 10 lbs/ft³ (col 4, lines 15-25). It is further disclosed that the sheet is 0.030 inch thick and has an electrical resistivity of 10.500 $\mu\Omega$ -m (col 4, lines 40-46). In addition, since the specific intercalated graphite material has been taught as well as the specific density and electrical resistivity, it is understood that the specific electrical

and thermal conductivity is an inherent property of the material due to the intrinsic nature of the flexible-intercalated-exfoliated graphite material.

Thus, the claims are anticipated.

3. Claims 1-2, 5-13 and 16-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Shane et al 3404061.

As to claims 1-2 and 12-13:

Shane et al disclose a flexible sheet material consisting of graphite (col 1, lines 13-17); the flexible graphite material was first expanded and then compressed (col 1, lines 25-28/col 7, lines 48-51). It is disclosed that interlayer attack of graphite particles is achieved by subjecting the graphite particles to oxidizing conditions wherein such oxidizing mixtures may be employed to controlled interlayer attack and may be nitric acid, chromic acid, and the likes (col 7, line 68 to col 8, line 25).

As for claims 5 and 16:

It is disclosed that the invention provides laminate or composite structures comprising pliable graphite sheet material (col 1, line 48-51). It is also taught that graphites are made up of layer planes of hexagonal arrays or networks (col 2, lines 38-42).

On the matter of claims 6-10, 17-20 and 22:

It is disclosed that flexible graphite has a density of between 40-120 lbs/ft³ (TABLE II); a thermal conductivity between 0.2-1.5 BTU-ft/hr-ft²F (TABLE II/col 13, lines 10-15); an electrical resistivity of 1000 $\mu\Omega$ -cm (TABLE II); the thickness ranges from about 0.0001 to about 0.500 inch (col 13, lines 34-37); the density of the graphite material can range from about

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5-137 pounds/ft³ (col 13, lines 35-41). In addition, since the specific intercalated graphite material has been taught as well as the specific density, electrical resistivity and thermal conductivity, it is understood that the specific electrical conductivity is an inherent property of the material due to the intrinsic nature of the flexible-intercalated-exfoliated graphite material.

Regarding claims 11 and 21:

It is disclosed that the quantity of the phenolic resin used was about 30 % by weight of the graphite masses (col 7, lines 14-21).

Thus, the claims are anticipated.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mercuri 5846459 as applied to the preceding claims above, and further in view of Mercuri et al 5902762.

Mercuri '459 is applied, argued and incorporated herein for the reasons above. However, Mercuri'459 do not disclose the graphite sheet containing the specific amount of resin.

Mercuri et al'762 disclose that a flexible graphite sheet immersed in liquid resin (col 3, lines 12-16); wherein a control sample retained only 5 % by weight of resin (col 4, line 23-26).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the graphite sheet of Mercuri'459 containing the specific resin amount of Mercuri et al'762 as Mercuri et al'762 teach that it has been proposed to increase the

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sealability of flexible graphite sheet or foil by impregnating the same with resin. Thus, an enhanced sealing feature within the graphite sheet is obtained.

Response to Arguments

6. Applicant's arguments filed 11/12/03 have been fully considered but they are not persuasive. The main contention of applicants' argument is premised on the assertion that "the process of exfoliation vaporizes the intercalants for, indeed, it is this vaporization which causes expansion of the graphite flake....Thus, the intercalants do not remain in the flake after exposure to heat". In this respect, it is first noted that the instant claims are *silent* to this specific process step (i.e. the process of exfoliation vaporizing the intercalants) or to the specific graphite structure that might be implied therefrom. Accordingly, the instant claims merely recite "a compressed sheet of graphite having graphite intercalation compound" or "a process for preparing a material for preparing articles comprising intercalating a sheet of particles of exfoliated graphite to form graphite intercalation compounds and compressing the sheet". Thus, one way or another, the claim language is not commensurate to the specific "already formed graphite sheet being exposed to graphite intercalation compounds, which intercalate into the sheet and remain present" that applicants appear to be arguing as the claimed invention.

It is secondly noted that assuming that the "the very process of exfoliation vaporizes the intercalants" occurs as applicants argue and "thus, the intercalants do not remain in the flake after exposure to heat", since applicants have not provided sufficient, substantial and objective evidence showing that, in fact, no intercalants at all remain in the flake, or otherwise stated, the process of exfoliation fully-completely vaporizes 100 % of the intercalants, the examiner still

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believes that, at least, a little amount of non-neglectable intercalants do remain or are present in the flake. This standpoint is further considered valid or applicable because the “exfoliation” process itself simply casts off in scales or laminae; or removes the surface of in scales or laminae; or split into or give off scales or laminae; or allows to come off in thin layers or scales; or grow by or as if by producing or unfolding layers or scales. Thus, the exfoliation process per se lacks the necessary vaporizing, heating or temperature treatment step to: a) vaporize the intercalants from the graphite material, and/or b) produce the required graphite structure as instantly argued by the applicants.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro
Examiner
Art Unit 1745


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